

Multi-Mission Support for Current and Future Systems

The Joint Polar Satellite System (JPSS) Common Ground System (CGS), developed and deployed by Raytheon Intelligence, Information and Services (IIS), manages and supports numerous missions. Managing multiple satellite missions requires sophisticated resource deconfliction and scheduling capabilities to ensure high data availability and the lowest latency from all of the missions. Figure 1 shows all possible downlink locations available to the CGS, while Figure 2 illustrates how the multiple missions scheduled by CGS utilize these assets. Deconfliction of ground station usage in accordance with specific mission constraints is the starting point for building an enterprise schedule. Unexpected outages can remove ground assets from the schedule, requiring the Mission Management software to quickly reconfigure the schedule to reallocate the remaining assets to the missions. Figures 4 through 9 show some typical anomalies and their resolutions.

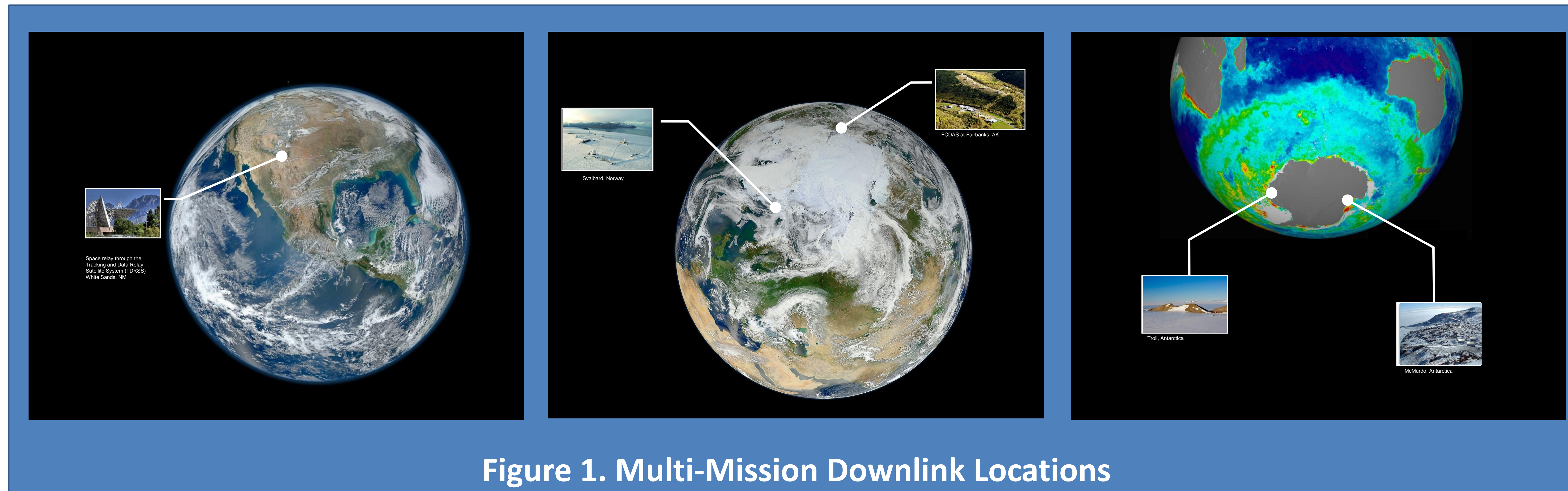


Figure 1. Multi-Mission Downlink Locations

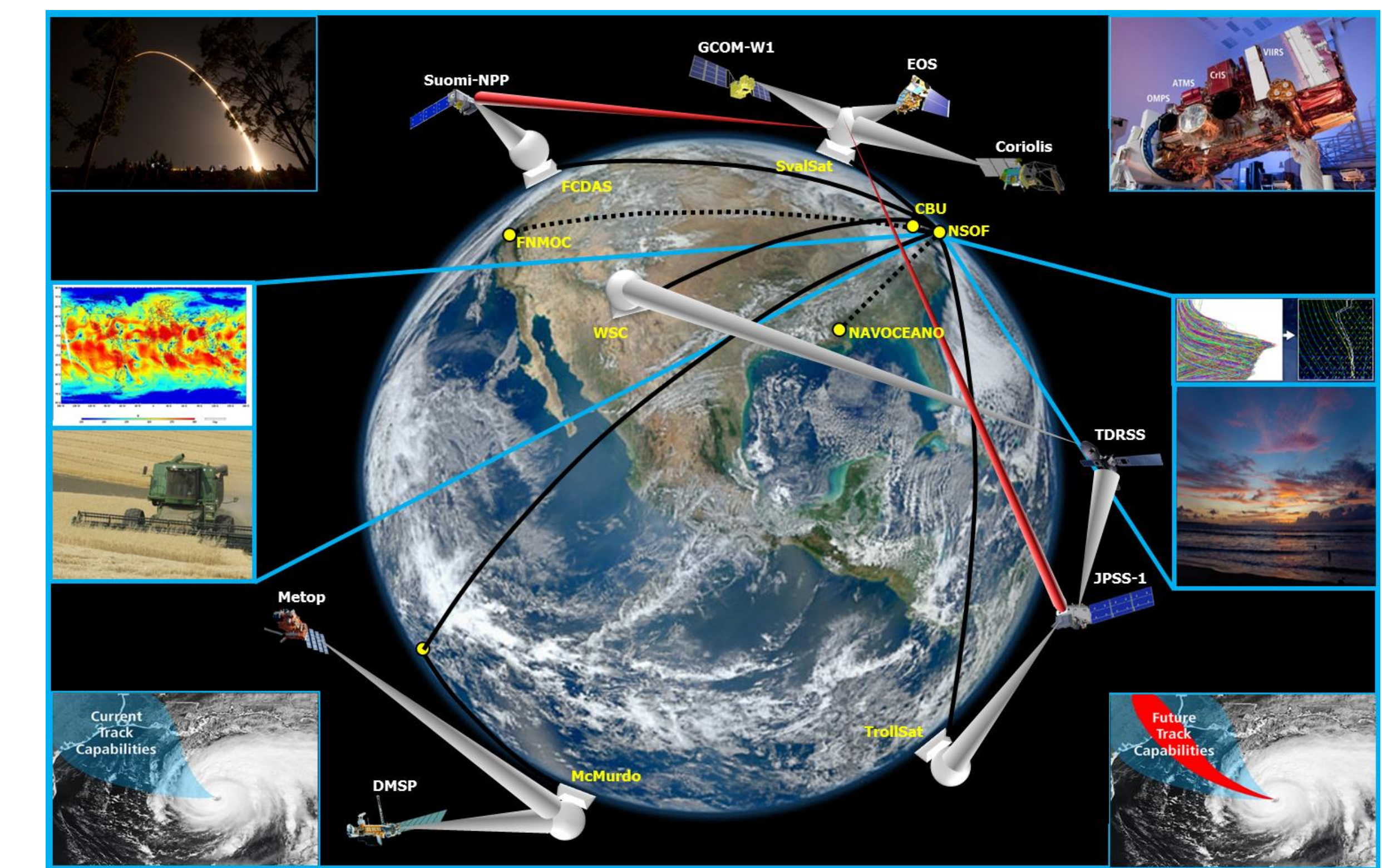


Figure 2. Multi-Mission Operations Concept.

Resource	Background
Coriolis	
GCOM-W1	
J01	
NPP	
Jason-2	
Landsat-8	
AQUA	
AURA	
METOP-A	
METOP-B	
NOAA-15	
NOAA-18	
NOAA-19	

Figure 3. Key

Spacecraft are color coded on the Mission Management timeline. Resource outages are colored red. The Mission Management software displays fully managed missions, such as J01 and NPP, and supported missions, such as Coriolis and GCOM

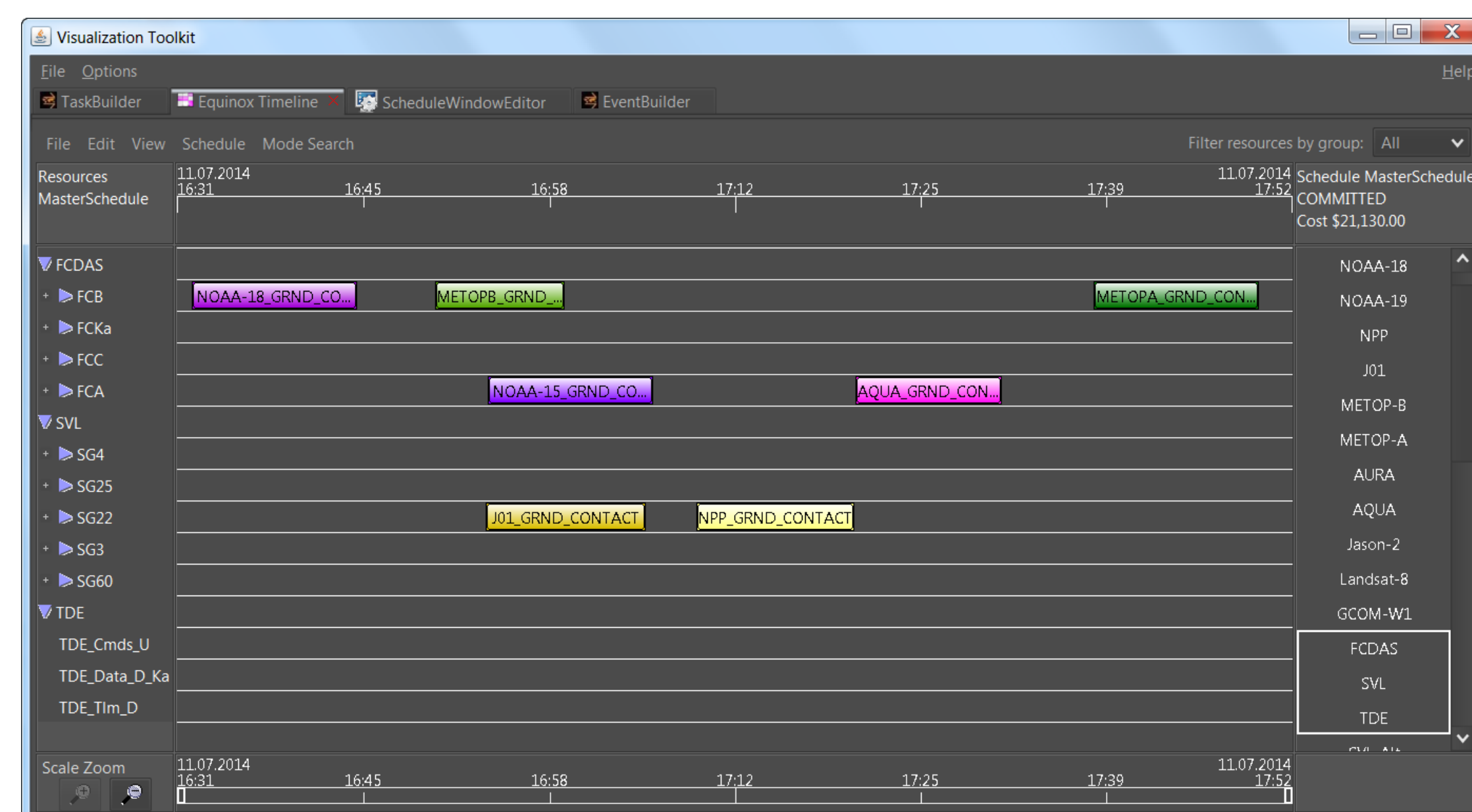


Figure 4. Initial Schedule

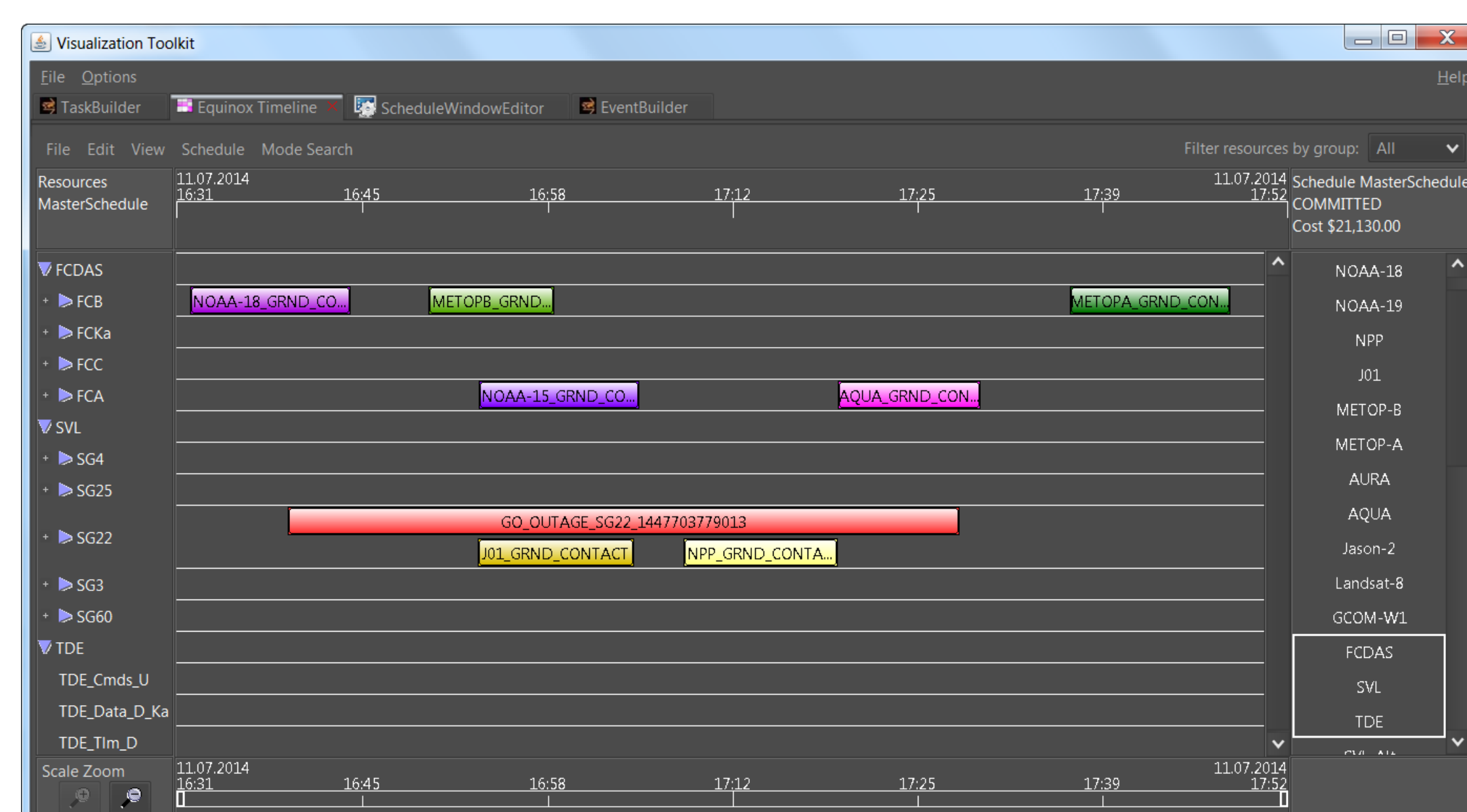


Figure 5. Antenna Outage

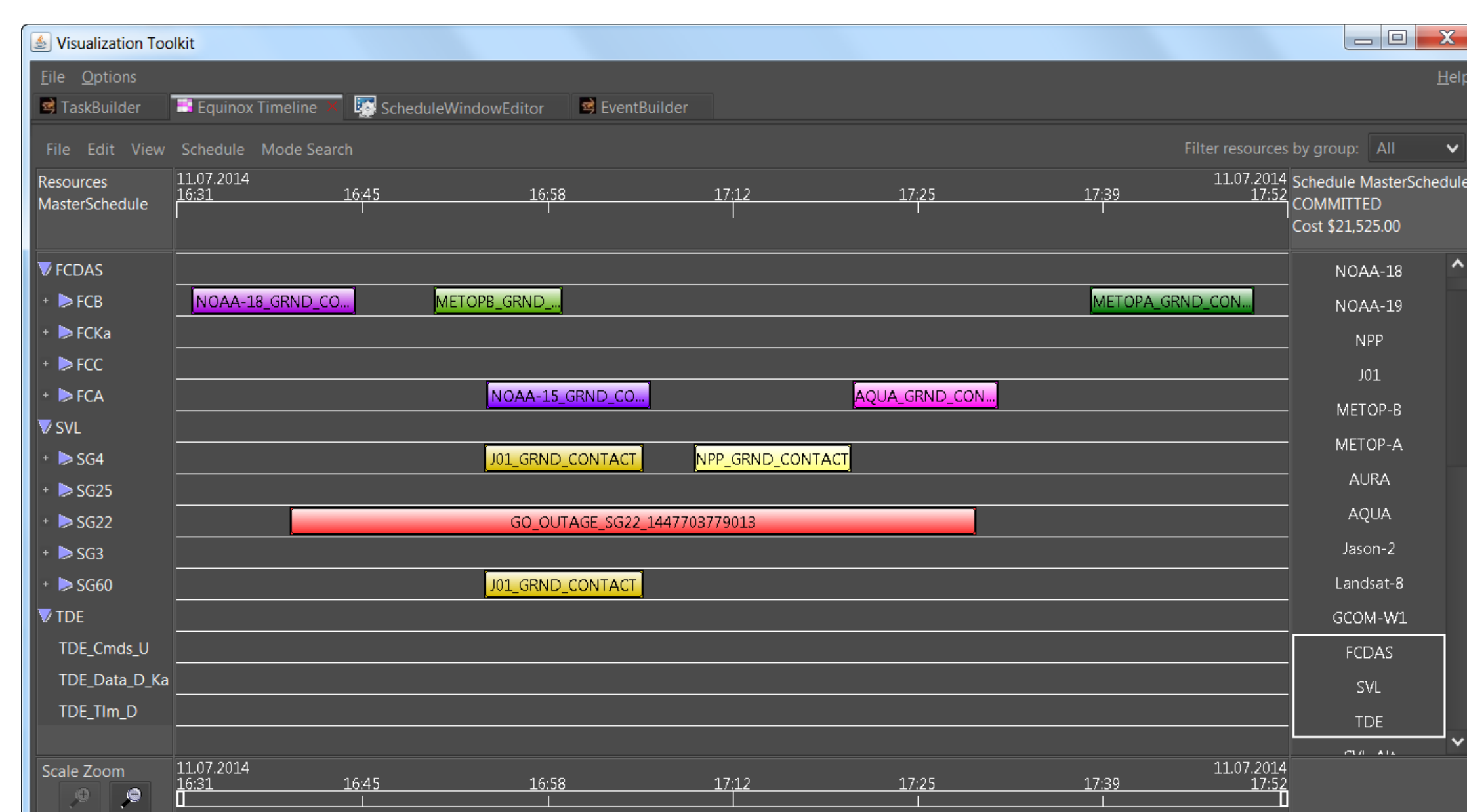


Figure 6. Resolved Schedule

Figure 4 shows the original schedule over a period of 1.5 hours. It shows two downlink sites (FCDAS, SVL) and their antennas as well as a TDRSS asset, along with schedules for data acquisition for seven satellites.

Figure 5 shows an outage for the Svalbard antenna SG22. Two downlinks are scheduled during the outage, for JPSS-1 and S-NPP.

Figure 6 shows how Mission Management automatically resolved the outage, by moving contacts to other assets capable of providing the service within known constraints. Here, the SG4 antenna does not have a Ka-band capability, so cannot support JPSS-1 mission data. SG4 receives telemetry data, while SG60 handles the mission data.

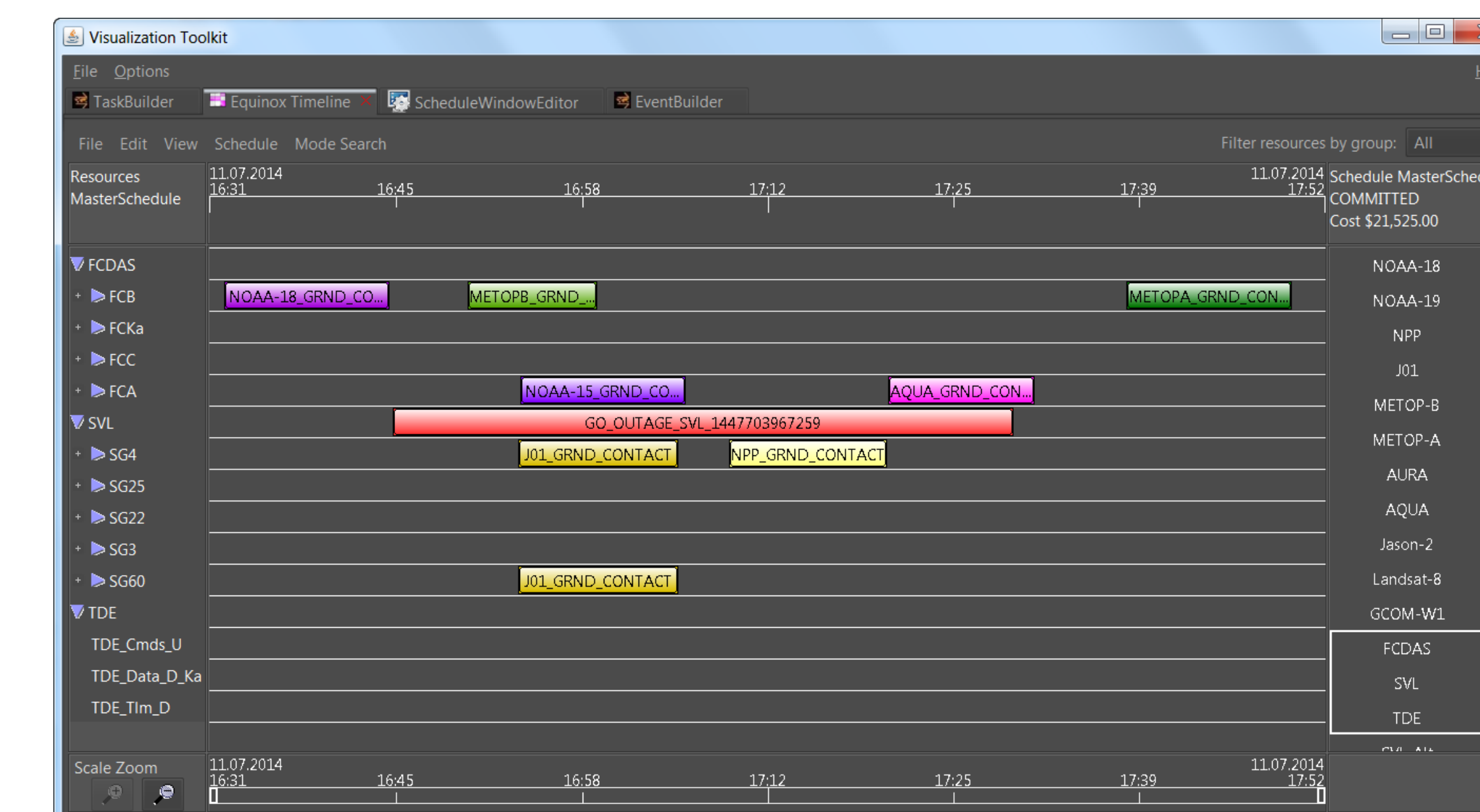


Figure 7. Site Outage

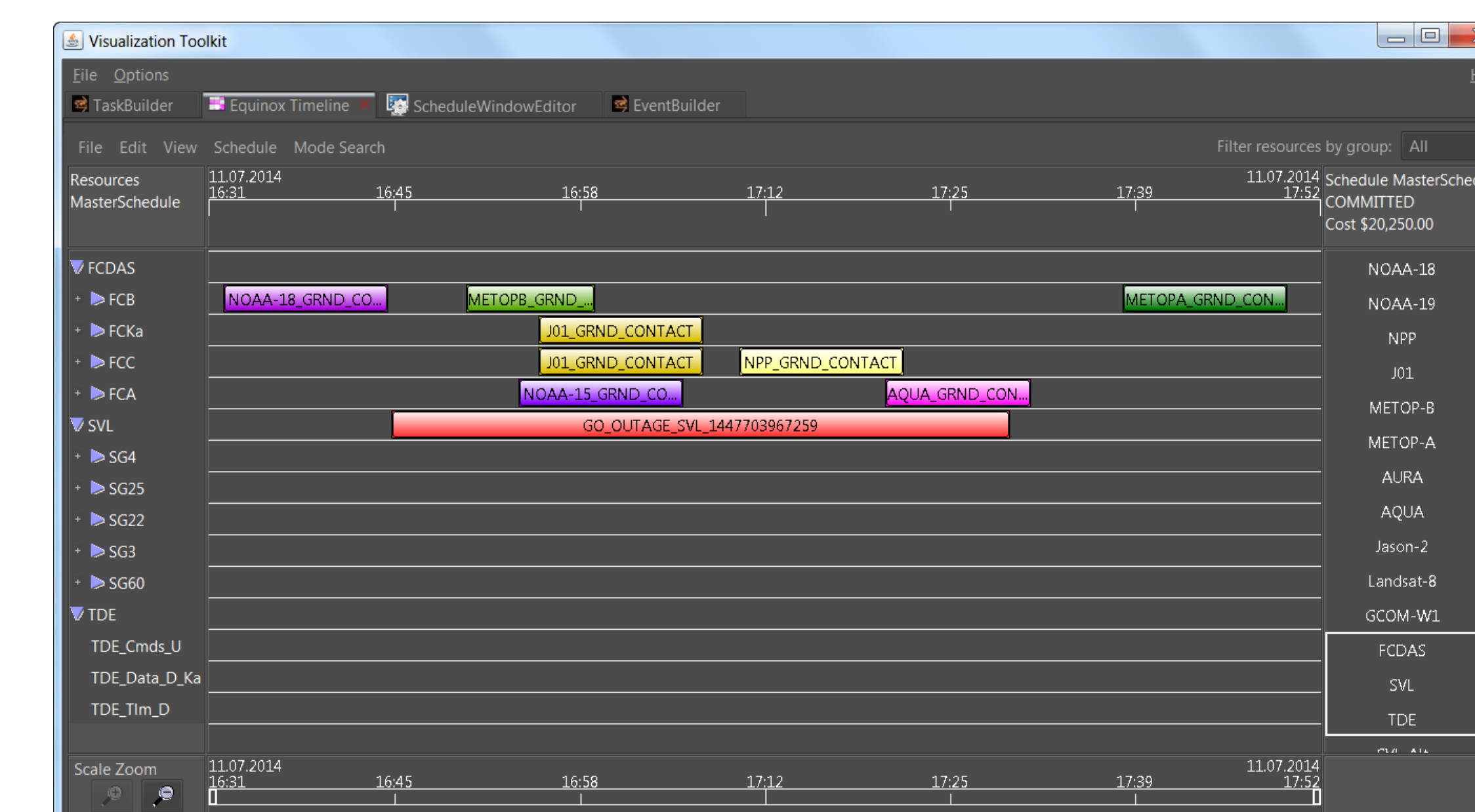


Figure 8. Resolve through FCDAS

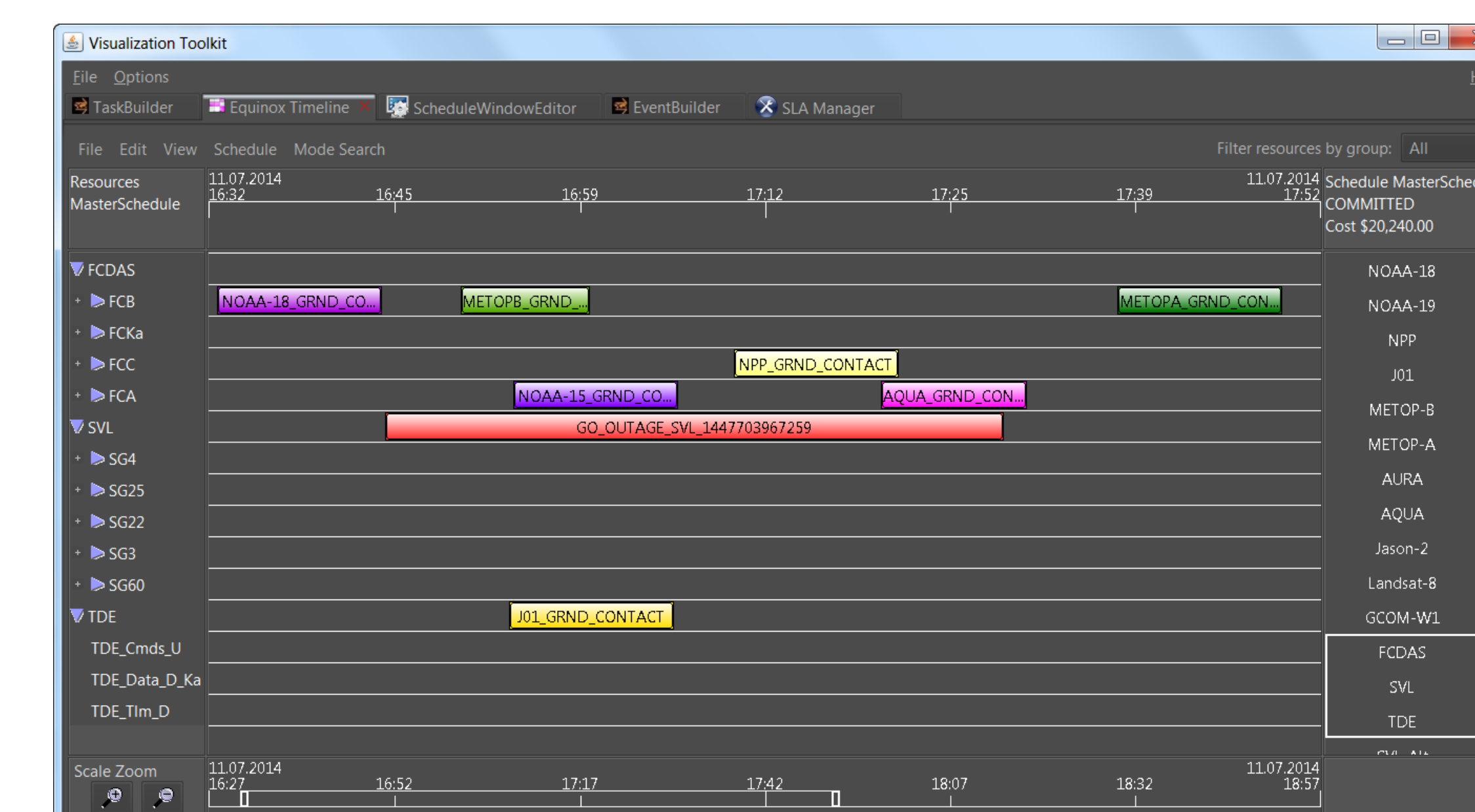


Figure 9. Resolve through TDRSS

In Figure 7, the entire Svalbard site is unavailable, requiring Mission Management to move all the scheduled contacts for Svalbard to other downlink locations

In Figure 8, the Svalbard downlinks have been moved to FCDAS. Again, the JPSS-1 telemetry and mission data links are handled by separate antennas.

Figure 9 shows the alternative where JPSS-1 uses the TDRSS link. Mission Management will chose either the scenario in Figure 8 or this scenario based on the most optimum resolution of resource constraints (such as availability).